CLAIMS

1. A method of significantly reducing or substantially preventing flowering in a perennial or biennial plant, the method comprising expressing a polypeptide from an isolated polynucleotide fragment comprising a nucleotide sequence as shown in Figure 2, or a fragment, derivative, or homologue thereof, in a perennial or biennial plant.

2. A method according to claim 1 wherein said plant is a perennial.

3. A method according to any of claims 1 or 2 wherein said plant is selected from the group consisting of crops belonging to the grass family of *Poaceae*; soybean, potato, oilseed rape, sunflower, alfalfa, sugar cane and cotton; herbs such as anise, basil, bay laurel, caper, caraway, cayenne pepper, celery, chervil, chives, coriander, dill, fennel, garlic, horseradish, leeks, lemon balm, liquorice, marjoram, mint, oregano, parsley, rosemary, sesame, tarragon and thyme; fruits and vegetables, such as banana, blackberry, blueberry, strawberry, and raspberry, carrot, coffee, eggplant, grapes, honeydew, mango, onion, papaya, peas, peppers, pineapple,; rosaceous fruits such as apple, peach, pear, cherry and plum; vegetable brassicas such as brussel sprouts; woody species, such as eucalyptus, oak, pine and poplar.

4. Use of an isolated polynucleotide fragment comprising the nucleotide sequence of bases -3600 to 1624 of Figure 3, or a fragment, derivative, or homologue thereof for significantly reducing or substantially preventing flowering in a perennial or biennial plant.

5. Use of an isolated polynucleotide fragment according to claim 4, wherein said fragment has the nucleotide sequence of bases -3600 to 1242.

6. Use of an isolated polynucleotide fragment according to claim 4, wherein said fragment has the nucleotide sequence of bases 1 to 1242.

7. Use of an isolated polynucleotide fragment according to claim 4, wherein said fragment has the nucleotide sequence of bases 1 to 1624.

8. A method of significantly reducing or substantially preventing flowering in a perennial or biennial plant, the method comprising expressing a polypeptide from an isolated polynucleotide fragment comprising the nucleotide sequence of bases -3600 to 1624 of Figure 3, or a fragment, derivative, or homologue thereof.

9. Use of an isolated polynucleotide fragment having a nucleotide sequence of bases -3600 to -1 as shown in Figure 3, or a fragment or derivative thereof, for upregulating gene expression in the apex and leaves of a perennial or biennial plant during conditions that lead to flowering.

10. A method of significantly reducing or substantially preventing flowering in a perennial or biennial plant, the method comprising expressing an isolated polypeptide, or functional fragment, derivative or homologue thereof, wherein said polypeptide fragment, derivative or homologue thereof, comprises the amino acid sequence YESP(K/R).

11. A method of significantly reducing or substantially preventing flowering in a perennial or biennial plant, the method comprising expressing an isolated polypeptide having an amino acid sequence as shown in Figure 4, or a functionally active fragment, derivative or homologue thereof, in said plant.

12. A method according to claim 11, wherein said fragment, derivative or homologue of said polypeptide includes the sequence of YESP(K/R) located between residues about 100 and about 120, from the N-terminus.

13. A transgenic perennial or biennial plant transformed with a polynucleotide fragment comprising the nucleotide sequence of bases -3600 to 1624 of Figure 3, or a fragment, derivative,

or homologue thereof, wherein flowering by said plant has been significantly reduced or substantially prevented.

14. A transgenic plant according to claim 13, wherein said plant is a perennial.

15. A transgenic plant according to claim 13 wherein said plant is selected from the group consisting of crops such as those belonging to the grass family of *Poaceae*; soybean, potato, oilseed rape, sunflower, alfalfa, sugar cane and cotton; herbs such as anise, basil, bay laurel, caper, caraway, cayenne pepper, celery, chervil, chives, coriander, dill, fennel, garlic, horseradish, leeks, lemon balm, liquorice, marjoram, mint, oregano, parsley, rosemary, sesame, tarragon and thyme; fruits and vegetables, such as banana, blackberry, blueberry, strawberry, and raspberry, carrot, coffee, eggplant, grapes, honeydew, mango, onion, papaya, peas, peppers, pineapple; rosaceous fruits such as apple, peach, pear, cherry and plum; vegetable brassicas such as brussel sprouts; woody species, such as eucalyptus, oak, pine and poplar.

16. A method of inducing early flowering in a perennial or biennial plant, said method comprising expressing a polynucleotide fragment in a plant, said fragment comprising a sequence which is complementary to any one of the sequences, fragments, derivatives or homologues thereof of Figures 2 or 3.

17. A method of significantly reducing or substantially preventing flowering in a monocotyledonous plant, the method comprising expressing a polypeptide from an isolated polynucleotide fragment comprising a nucleotide sequence as shown in Figure 2, or a fragment, derivative, or homologue thereof, in a monocotyledonous plant.

18. A method according to claim 17 wherein said plant is selected from the group consisting of crops belonging to the grass family of *Poaceae*; soybean, potato, oilseed rape, sunflower, alfalfa, sugar cane and cotton; herbs such as anise, basil, bay laurel, caper, caraway, cayenne pepper, celery, chervil, chives, coriander, dill, fennel, garlic, horseradish, leeks, lemon

balm, liquorice, marjoram, mint, oregano, parsley, rosemary, sesame, tarragon and thyme; fruits and vegetables, such as banana, blackberry, blueberry, strawberry, and raspberry, carrot, coffee, eggplant, grapes, honeydew, mango, onion, papaya, peas, peppers, pineapple,; rosaceous fruits such as apple, peach, pear, cherry and plum; vegetable brassicas such as brussel sprouts; woody species, such as eucalyptus, oak, pine and poplar.

19. Use of an isolated polynucleotide fragment comprising the nucleotide sequence of bases -3600 to 1624 of Figure 3, or a fragment, derivative, or homologue thereof for significantly reducing or substantially preventing flowering in a monocotyledonous plant.

20. Use of an isolated polynucleotide fragment according to claim 19, wherein said fragment has the nucleotide sequence of bases -3600 to 1242.

21. Use of an isolated polynucleotide fragment according to claim 19, wherein said fragment has the nucleotide sequence of bases 1 to 1242.

22. Use of an isolated polynucleotide fragment according to claim 19, wherein said fragment has the nucleotide sequence of bases 1 to 1624.

23. A method of significantly reducing or substantially preventing flowering in a monocotyledonous plant, the method comprising expressing a polypeptide from an isolated polynucleotide fragment comprising the nucleotide sequence of bases -3600 to 1624 of Figure 3, or a fragment, derivative, or homologue thereof.

24. Use of an isolated polynucleotide fragment having a nucleotide sequence of bases -3600 to -1 as shown in Figure 3, or a fragment or derivative thereof, for upregulating gene expression in the apex and leaves of a monocotyledonous plant during conditions that lead to flowering.

25. A method of significantly reducing or substantially preventing flowering in a monocotyledonous plant, the method comprising expressing an isolated polypeptide, or functional fragment, derivative or homologue thereof, wherein said polypeptide fragment, derivative or homologue thereof, comprises the amino acid sequence YESP(K/R).

26. A method of significantly reducing or substantially preventing flowering in a monocotyledonous plant, the method comprising expressing an isolated polypeptide having an amino acid sequence as shown in Figure 4, or a functionally active fragment, derivative or homologue thereof, in said plant.

27. A method according to claim 26, wherein said fragment, derivative or homologue of said polypeptide includes the sequence of YESP(K/R) located between residues about 100 and about 120, from the N-terminus.

28. A transgenic monocotyledonous plant transformed with a polynucleotide fragment comprising the nucleotide sequence of bases -3600 to 1624 of Figure 3, or a fragment, derivative, or homologue thereof, wherein flowering by said plant has been significantly reduced or substantially prevented.

29. A transgenic plant according to claim 28 wherein said plant is selected from the group consisting of crops such as those belonging to the grass family of *Poaceae*; soybean, potato, oilseed rape, sunflower, alfalfa, sugar cane and cotton; herbs such as anise, basil, bay laurel, caper, caraway, cayenne pepper, celery, chervil, chives, coriander, dill, fennel, garlic, horseradish, leeks, lemon balm, liquorice, marjoram, mint, oregano, parsley, rosemary, sesame, tarragon and thyme; fruits and vegetables, such as banana, blackberry, blueberry, strawberry, and raspberry, carrot, coffee, eggplant, grapes, honeydew, mango, onion, papaya, peas, peppers, pineapple; rosaceous fruits such as apple, peach, pear, cherry and plum; vegetable brassicas such as brussel sprouts; woody species, such as eucalyptus, oak, pine and poplar.

30. A method of inducing early flowering in a monocotyledonous plant, said method comprising expressing a polynucleotide fragment in a plant, said fragment comprising a sequence which is complementary to any one of the sequences, fragments, derivatives or homologues thereof of Figures 2 or 3.

31. An expression cassette comprising a promoter and a nucleotide sequence as shown in Figure 2 or Figure 3, or a fragment, derivative or homologue thereof.

32. An expression cassette according to claim 31, wherein said promoter is selected from the group consisting of a constitutive promoter, an inducible promoter and a developmentally regulated promoter.

33. An expression cassette according to claim 31, wherein said promoter is selected from the group consisting of the monocot and dicot actin and ubiquitin promoters, monocot and dicot glyceraldehyde dehyrogenase (GAPDH) promoters, the cauliflower mosaic virus 35S (CaMV 35S) and 19S (CaMV 19S) promoters, the 35S CaMV promoter containing the translational enhancer (TMV omega element), the nopaline synthase (NOS) promoter, the octopine synthase (OCS) promoter and the polynucleotide fragment according to claim 9.

34. A method of significantly reducing or substantially preventing flowering in a perennial or biennial plant, the method comprising inserting an expression cassette according to claim 31 into a plant host cell, growing the said transformed host cell in a suitable culture medium and expressing said DNA sequence to produce said protein, and wherein said expressed protein significantly reduces or substantially prevents flowering in said plant.

35. A method of significantly reducing or substantially preventing flowering in a monocotyledonous plant, the method comprising inserting an expression cassette according to claim 31 into a plant host cell, growing the said transformed host cell in a suitable culture medium

and expressing said DNA sequence to produce said protein, and wherein said expressed protein significantly reduces or substantially prevents flowering in said plant.

36. A biological vector comprising an expression cassette according to claim 31.

37. A biological vector according to claim 36, wherein said vector is selected from the group consisting of a virus and a bacterium.

38. A host cell stably transformed with the polynucleotide fragment of claim 4, the expression cassette of claim 31 or the biological vector of claim 36.

39. A host cell according to claim 38, wherein said host cell is a cell selected from the group consisting of a bacterial cell, a yeast cell, and an insect cell.

40. An isolated polynucleotide fragment which comprises a nucleotide sequence comprising a transcriptional regulatory sequence, a sequence under the transcriptional control thereof which encodes an RNA sequence characterised in that the RNA sequence is anti-sense to an mRNA which codes for LpTFL1 or functional homologues hereof.

41. A polynucleotide fragment according to claim 40, wherein said fragment is from about 20 nucleotides in length up to the length of the relevant mRNA produced by the cell.

42. A polynucleotide fragment according to claim 40, wherein said fragment is from about 50 to about 1500 nucleotides in length.

43. A method of isolating a polynucleotide fragment having at least 65% identity with the sequence of Figure 2 or Figure 3, said method comprising the steps of:

(a) preparing a nucleotide probe capable of specifically hybridising to a plant LpTFL1 related gene or mRNA, wherein said probe comprises a contiguous portion of the coding sequence for LpTFL1 from ryegrass of at least 10 nucleotides in length;

(b) probing for other LpTFL1 related coding sequences in populations of genomic DNA fragments or cDNA fragments from a chosen plant using the nucleotide probe prepared according to step (a); and

(c) isolating a polynucleotide fragment comprising a portion encoding a protein having LpTFL1-like activity.

44. A method according to claim 43, wherein said polynucleotide fragment has a percentage value of identity with the sequence of Figure 2 or Figure 3 selected from the group consisting of 66%, 68%, 70%, 75%, 80%, 83%, 86%, 88%, 90%, 92%, 95%, 97% and 99%.

45. A method of producing a protein having LpTFL1 activity in a host organism comprising:

(a) inserting a DNA sequence encoding a protein having LpTFL1 activity into a host cell;

(b) growing the said transformed host cell in a suitable culture medium;

(c) expressing said DNA sequence to produce said protein; and

(d) isolating the protein product either from the transformed host cell or the culture medium or both and purifying it.

46. A method of significantly reducing or substantially preventing flowering in a plant, the method comprising expressing a polypeptide from an isolated polynucleotide fragment comprising a nucleotide sequence as shown in Figure 2, or a fragment, derivative, or homologue thereof, in a plant.

47. A method according to claim 46 wherein said plant is selected from the group consisting of monocots and dicots.

48. A method according to claim 46 wherein said plant is selected from the group consisting of an annual, a biennial, and a perennial.

49. A method according to claim 46 wherein said plant is selected from the group consisting of crops belonging to the grass family of *Poaceae*; soybean, potato, oilseed rape, sunflower, alfalfa, sugar cane and cotton; herbs such as anise, basil, bay laurel, caper, caraway, cayenne pepper, celery, chervil, chives, coriander, cumin, dill, fennel, garlic, horseradish, leeks, lemon balm, liquorice, marjoram, mint, oregano, parsley, rosemary, sesame, tarragon and thyme; fruits and vegetables, such as banana, blackberry, blueberry, strawberry, and raspberry, cantaloupe, carrot, cauliflower, coffee, cucumber, eggplant, grapes, honeydew, lettuce, mango, melon, onion, papaya, peas, peppers, pineapple, spinach, squash, sweet corn, tobacco, tomato, watermelon; rosaceous fruits such as apple, peach, pear, cherry and plum; vegetable brassicas such as broccoli, cabbage, cauliflower, brussel sprouts, beet and kohlrabi; woody species, such as eucalyptus, oak, pine and poplar.

50. An isolated polynucleotide fragment comprising the nucleotide sequence of bases -3600 to 1624 of Figure 3, or a fragment, derivative, or homologue thereof for use in significantly reducing or substantially preventing flowering in a plant.

51. An isolated polynucleotide fragment according to claim 50, wherein said fragment has the nucleotide sequence of bases -3600 to 1242.

52. An isolated polynucleotide fragment according to claim 50, wherein said fragment has the nucleotide sequence of bases 1 to 1242.

53. An isolated polynucleotide fragment according to claim 50, wherein said fragment has the nucleotide sequence of bases 1 to 1624.

54. A method of significantly reducing or substantially preventing flowering in a plant, the method comprising expressing a polypeptide from an isolated polynucleotide fragment as claimed in claims 50 to 53.

55. An isolated polynucleotide fragment having a nucleotide sequence of bases -3600 to -1 as shown in Figure 3, or a fragment or derivative thereof, for upregulating gene expression in the apex and leaves of a plant during conditions that lead to flowering.

56. A method of significantly reducing or substantially preventing flowering in a plant, the method comprising expressing an isolated polypeptide, or functional fragment, derivative or homologue thereof, wherein said polypeptide fragment, derivative or homologue thereof, comprises the amino acid sequence YESP(K/R).

57. A method of significantly reducing or substantially preventing flowering in a plant, the method comprising expressing an isolated polypeptide having an amino acid sequence as shown in Figure 4, or a functionally active fragment, derivative or homologue thereof, in said plant.

58. A method according to claim 59, wherein said fragment, derivative or homologue of said polypeptide includes the sequence of YESP(K/R) located between residues about 100 and about 120, from the N-terminus.

59. A method of significantly reducing or substantially preventing flowering in a plant, the method comprising inserting an expression cassette according to claim 31 into a plant host cell, growing the said transformed host cell in a suitable culture medium and expressing said DNA sequence to produce said protein, and wherein said expressed protein significantly reduces or substantially prevents flowering in said plant.

60. A transgenic plant transformed with the polynucleotide fragment of claim 50, wherein flowering by said plant has been significantly reduced or substantially prevented.

61. A transgenic plant according to claim 60, wherein said plant is selected from the group consisting of monocots or dicots.

62. A transgenic plant according to claim 60, wherein said plant is selected from the group consisting of annuals, biennials, or perennials.

63. A transgenic plant according to claim 60 wherein said plant is selected from the group consisting of crops such as those belonging to the grass family of *Poaceae*; soybean, potato, oilseed rape, sunflower, alfalfa, sugar cane and cotton; herbs such as anise, basil, bay laurel, caper, caraway, cayenne pepper, celery, chervil, chives, coriander, cumin, dill, fennel, garlic, horseradish, leeks, lemon balm, liquorice, marjoram, mint, oregano, parsley, rosemary, sesame, tarragon and thyme; fruits and vegetables, such as banana, blackberry, blueberry, strawberry, and raspberry, cantaloupe, carrot, cauliflower, coffee, cucumber, eggplant, grapes, honeydew, lettuce, mango, melon, onion, papaya, peas, peppers, pineapple, spinach, squash, sweet corn, tobacco, tomato, watermelon; rosaceous fruits such as apple, peach, pear, cherry and plum; vegetable brassicas such as broccoli, cabbage, cauliflower, brussel sprouts, beet and kohlrabi; woody species, such as eucalyptus, oak, pine and poplar.

64. A method of inducing early flowering in a plant, said method comprising expressing a polynucleotide fragment in a plant, said fragment comprising a sequence which is complementary to any one of the sequences, fragments, derivatives or homologues thereof on Figures 2 or 3.